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ABSTRACT

This booklet was prepared as a guide for New Mexico teachers for incorporating environmental education into existing curricula. The booklet begins with a discussion of the objectives of environmental education and the role of schools. Brief discussions are given on the social and economic implications of environmental education, a single procedure to institute a program, inquiry teaching methods, environmental concepts and designs, and environmental education settings. Finally, the booklet provides a list of readings, periodicals, publications, and conservation organizations. (MR)

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ENVIRONMENTAL EDUCATION MANUAL

FOR

NEW MEXICO TEACHERS

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FOR NEW MEXICO TEACHERS

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FORWARD

Mounting public concern over New Mexico's environmental problems calls for strong response from the educational community. At a deeper level, scientists tell us that environmental conservation is no longer merely a desirable esthetic cause. It has become a matter of human survival. Therefore, it is incumbent upon schools to help students meet this challenge--as informed citizens and as active participants in environmental reform.

As a first step in this direction, the New Mexico State Board of Education, the Department of Education, and the Environmental Education Committee recommend this Environmental Education Manual for New Mexico Teachers. We view this document as an experimental beginning--a draft statement of environmental education concepts and practices--to be tested through teacher-student application.

The manual synthesizes ideas germinated by the Environmental Education Committee over the past three years--in a format that invites immediate use by interested teachers. Thus, a working document gets to selected people ready to use it now.

You who use this first edition will discover its strengths and weaknesses. We actively seek your participation in the critique that will lead to an improved second edition for general distribution. This critique-through-use procedure allows us to bypass the time consuming curriculum studies and reviews that usually precede educational innovations. In this way we meet the immediate need to start environmental education in our schools, and we strike

directly to the ultimate test: experience.

During the meeting of elementary and secondary principals this spring, my staff and I will help interested administrators get started with this manual, including arrangements for teacher workshops. We aim to involve schools that are ready and willing to participate in the experiment, selected on a basis that will provide a regional cross-section of the State.

I am particularly pleased that William E. Brown of Santa Fe wrote the manual. A free lance writer on environmental affairs, Mr. Brown has been a member of the Environmental Education Committee from its inception. He was formerly associated with the National Park Service as writer-editor, historian, and, most recently, environmental specialist. He has given us a good philosophic base for environmental education, practical examples of application, and an excellent list of resources.

As a final word, let me re-emphasize the great importance of teacher participation in the critique of this experimental effort. Through your principals, let me know what works and doesn't work, and the new ideas and approaches that you develop in the crucible of action.

Leonard J. DeLayo

Leonard J. DeLayo
Superintendent of Public Instruction

P R E F A C E

Environmental education is all about choosing life. It asks the question: What kind of a world do we want? It strives to give the student the sensory, affective, and logical wherewithal to choose and to shape a world of life instead of death, of quality living instead of mere existence.

Public education in America has always aimed to give students the motivation and the tools with which to realize themselves and contribute to the welfare of society at large. Thus, the above stated objectives of environmental education are not new. What is new is the world that technological man has wrought. His impact on the physical environment threatens the conditions that allow quality life. Environmental education responds to this threat by showing students that their chances for the good life utterly depend upon the existence of a healthy physical environment. It aids them to discover the natural laws that man must obey to perpetuate a healthy physical environment. It helps them to envision a society that conforms to these laws. And, finally, it challenges students to begin shaping such a society now.

Essentially, environmental educaiton is a response to man's cultural evolution. Once he was a dwarf without tools, and nature was a threatening giant. But in the last century man has turned the tables. Combining his numbers, his social organization, and his science and technology, man has become the giant, and it is

nature that is threatened. This reversal of roles, this switch in the relationships of power, happened so quickly that man's attitudes toward the natural world have not cuaght up. The young giant still thinks that he must beat nature, conquer it. This attitude, paired with the powerful tools of science and technology, rips the natural fabric into shreds.

It is time to change that attitude, time for man to catch up with himself, time that he recognizes both his strength and his dependence. Environmental education aims to bring man and nature into complementary relationship. It would change man from a young giant smashing the earthly loom with a sledgehammer into a mature craftsman. Understanding and abiding by nature's warp and woof, he would weave only those designs that embellish it.

Students today, like adults, receive a mixed bag of stimuli that reflect a world in critical flux.

They hear the traditional adult pronouncements: All will be well. The world has not really changed. Get a good education. Then get a good job. You'll see that I am right--when you get old enough to judge.

But the world they live in daily pulls the rug from under these assumptions. Worse, in the assumptions and in the adult's saying them, students detect illogic and hypocricy.

Students today, starting very young, are too sophisticated and too well informed not to see that the world is in trouble. They see the level of violence and potential violence on the rise. They see

the world's garden spots and their own daily habitats diminish under the pall of pollution and piles of junk. They see and suffer from socio-economic disparities that waste human resources and degrade individual persons.

Dick and Jane just aren't running and playing the way they used to do.

Students know, from these many symptoms, that all is not well. They know that our own particular society, as well as mankind in general, is suddenly playing catch-up ball in a world whose rules keep changing.

In different degrees, depending on their ages, their temperaments, and what life has done to them, they question the future--even if there is going to be one. Amongst many students the extremes of doubt and pessimism that they feel surface in a whole range of behavioral syndromes--from dropout and drug abuse to militant social and political action. Between these extremes, a majority suffers through, routinely doing what is requested, just getting by.

For older students, especially the gifted ones, business as usual is unreal. Specifically, education as usual neglects their most vital concerns.

In this atmosphere, frustration and discontent mark the process of education. Whether facing the gifted, articulate student, the "average" withdrawn student, or the slower student hobbled by inadequacy, the teacher bears the brunt--trying to make conventional

education mean something to students who feel that the world is dragging them toward a forbidding future which they have neither shaped nor consented to.

In a modest, first-step way, this manual attempts to come to grips with this kind of a world, and with the role of education in it. Its thesis is that environmental education--in the broadest sense of that term--offers teachers and students escape from the mythic world of Dick and Jane to the real world of today.

Environmental education, as used throughout this manual, refers equally to natural processes and social processes. The asumption is, the fact is, that the total environment is the product of the interaction of these processes. Harvard Ecologist Fred E. Smith has phrased it nicely:

> The human environment is an immense complex of natural elements, man-made structures, institutions, societies and other people... Environmental quality and human welfare are not two independent evaluations. They are two views of the same system of interactions. It is not possible for one to remain good while the other is bad.

It is apparent that environmental education bears small resemblance to old style conservation education. It does not put man here, nature there. Rather, it encompasses the total environment, and it puts Man squarely in the middle of the Web of Life. It is as concerned about dust bowls in individual souls and human communities as it is about dust bowls in the physical environment. It sees in the attitudes and objectives of people--the frames which determine their social processes and interactions with the rest of nature--

the root causes of environmental crisis.

The great objective of environmental education is to help mankind rejoin the natural world, instead of destroying it, so that people can have a chance at the good life. The state of health of the natural world, the biosphere, determines man's chances for the good life. A dead world means no human life. A sickly world means degraded, hard-scrabble human life. A healthy world means at least a chance for quality life, if humans are smart enough to choose the right options.

To re-establish a complementary relationship between mankind and the rest of nature, people must understand the way that the natural world works, and they must develop an ethical relationship to it. This ethic, prophetically stated many years ago by Aldo Leopold, "changes the role of Homo sapiens from conqueror of the land community to plain member and citizen of it." It is significant that Leopold drew much of his inspiration from his forestry work in New Mexico.

When social processes work together with natural processes, instead of at cross purposes, the result will be a healthy environment conducive to human welfare.

Thus, environmental education is the medium that allows people to envision a sane ecology of man. Having seen that vision, the misplaced energies of frustration and discontent produced by things as they are can become a positive force of environmental reform, leading to things as they should be.

New Mexico is one of the few states where there is still a chance to avert the terrible environmental errors whose results plague most of the nation. Despite its long human history, New Mexico comes into the latter years of the 20th century with much of its physical environment still intact. In essence, until just yesterday, it remained a frontier. Thus, for most of its history the full powers of technological man passed it by. Today this is changing. Technological man in full force is descending on New Mexico. The question is, how shall his powers be applied: To rip into the safe and steal the state's environmental capital, or to respect the limits of this environment, which means living off the interest?

During the next decade the people of New Mexico will make the decisions--social, economic, and political--that will determine its future. Depending on the quality of those decisions, New Mexico will remain a quality environment, meriting the sobriquet, "Land of Enchantment" or it will be turned into another "Any place, U.S.A."

We are, in other words, at a crucial fork in the road--one way leading to environmental conservation, the other to environmentaal degradation. Only an informed public, one that recognizes the fragile, marginal nature of New Mexico's physical environment, can hope to cope with the cut-and-run, quick-buck pressures that increasingly bear in on us.

Fortunately, New Mexico decision makers--politicians, planning

commissions, regulatory agencies--are beginning to respond to the challenge of maintaining New Mexico's environmental health. Under countervailing pressures from conservation groups, industrial and development projects are being scrutinized more carefully. Standards for quality air, water, and land use are being developed, and tentatively applied. And it is beginning to be understood that the condition of the social environment will critically affect the kind of future we get: People desperate for a payroll will embrace any enterprise, however destructive it might be of the physical environment, rather than pick and choose to get compatible industries and developments.

Despite these hopeful signs the philosophy that would sacrifice tomorrow for today's quick gains is very much alive. And those who have sacked other parts of the country look eagerly toward New Mexico as a new field for cheap exploitation. These pressures will increase. Unless the poople of this state are unequivocal in support of bio-politics and bio-economics, as opposed to the politics and economics of expediency, these pressures will subvert the best intentions of the decision makers.

Environmental education can put the students of this state--as students and as tomorrow's voters--into the front lines of the environmental conservation struggle. It can show how New Mexico's natural and social processes interact to produce quality, or degradation. It can show students how people must use social processes to get the laws, the regulations, and the decisions that respect, rather than violate, natural processes.

Because environmental crisis, though long abuilding, has emerged so suddenly as a commonly recognized critical issue, the social processes--including education--are just beginning to respond. There are hopeful signs that the New Mexico Legislature will soon endorse the first essential steps of an environmental education effort that will eventually give every teacher the guidance and material support warrented by the need.

Meanwhile, within the frame of current teaching approaches and responsibilities, much can be done. This manual is designed as an interim instrument for the individual teacher who shares the environmental concerns of its author-compiler and its sponsors--the State Board of Education, the State Department of Education, and the State Environmental Education Committee.

This manual aims to provide practical guidance to the teacher as to the why's, what's, and how's of environmental education--which is treated as a curriculum-integrated, interdisciplinary philosophy, rather than a separate subject. Opportunities and resources for applying this phil sophy are suggested on the basis of ready availability, <u>today</u>, for the working teacher. It is recognized that pie-in-the-sky proposals and potentials are simply inappropriate until the State Department of Education and the individual school districts can provide full-scale teacher support.

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Finally, let me conclude this Introduction with a statement of conviction that alerts you, the teacher, to the bias that I have

built into every phrase and page that follows.

The philosophy of environmental education won't be found in one pretty package, but rather in various ideas, sources, and applications that do have a common denominator. That base point is this: Man, through technological extensions of himself, has become the prime, short-term shaper of the physical environment. On balance, his applications of technological power have been more destructive than constructive--because he has taken the physical environment for granted.

To reverse this trend, to bring himself back into constructive relationship with the physical environment, technological man must adopt a philosophy of restraing--one that respects the limitations of the natural world, and acknowledges man's absolute dependence upon that world.

This new view of man's place in the world can be termed the environmental imperative. The distilled essence of the environmental imperative is expressed as follows:

> The biosphere is finite and fragile.
>
> Men must stop treating it as though it were infinite and elastic.
>
> They must stop viewing themselves, in the biological sense, as special creations independent of the web of life.
>
> They must stop damaging and cutting the strands of this web, which is their only support in the surrounding abyss of dead space.

In this light, technological applications are judged good if they

work within nature's limitations, bad if they damage the natural fabric. All other criteria must bow to this one.

It is apparent that this philosophy, followed to its conclusions, strikes to the heart of the traditional values and successes of our society. But unless environmental education does go deep, unless it exposes the conflicts between what worked yesterday and what must be done today if there is to be a tomorrow, it will be irrelevant. You just can't go on prescribing aspirin tablets for the cancer patient who needs major surgery.

All of this boils down to a simple formula:

Man is a part of his environment.

Man's environment is a dynamic system.

Man's welfare depends on the state of that system.

Man is responsible for his impact on that system.

William E. Brown
Santa Fe
November, 1970

CHAPTER I

ENVIRONMENTAL CRISIS AND EDUCATION FOR SURVIVAL

"Business as usual is suicide."

Barry Commoner

The heart of the present dilemma is this: Despite massive Educational campaigns by scientists, philosophers, and the public media, we refuse to face squarely the real meaning of environmental crisis. As a species we learned long ago to close our minds against the unthinkable. Sanity demanded it. Now we must stretch our consciousness and our strength to confront the unthinkable. We must re-evaluate the basic assumptions of our society, however sacrosanct, to determine their validity in the qualitatively new world that technological man has wrought.

The biosphere shakes like a strained muscle from the stresses put upon it by man. Man-made systems, their foundations trembling in the sands of environmental ignorance, ever more frequently fail. Individual people crack under the aggregating strains. Communities and neighborhoods falter and die. Nations bare their teeth and seek security in destruction.

With these warning signals raging about us, we continue to hug old patterns of behavior and action. Somehow we'll muddle through. Business as usual.

The facts say otherwise. They say that man will disappear from this earth--dragging the rest of the living host with him--unless he radically changes his value systems, and the behaviors and actions

that stem from them.

The teaching profession, like other groups, is caught in the current of business as usual. There are but two choices: either we slide complacently into the maelstrom, or we inspire ourselves and our students to strike for the shore.

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The rhetoric and the facts of environmental crisis are with us like the plague. Educational journals, scholastic publications, magazines, books, TV Specials, and political speeches batter us with prophesies of doom unless mankind changes its ways. Closer to home, newspapers headline symptoms of environmental disarray from one end of the state to the other: mercury in our waters, in our fish, and in the brains of poisoned people, massive applications of pesticides, Four Corners air pollution, unplanned land developments, and the like. Each report of insult to the physical environment triggers response from conservation groups, professional organizations, and government agencies. Meanwhile the social environment takes its knocks, expressed by the discontents of minorities, poor people, and students, and by the polarization that blocks constructive communications between contending segments of New Mexico's populace.

The teacher unaware of these goings on would have to be in solitary confinement. Therefore, it is not the purpose of this chapter to reiterate in detail the facts of environmental crisis. Rather, it distills the myriad facts into basic categories (which are fully

treated in the publications listed under Basic Readings). And it examines the implications of environmental crisis for the state's educational community--teachers and administrators alike.

The following list of basic categories is suggestive only--to be expanded as you see fit:

Population growth in an increasingly industrialized and urbanized society--with an accelerating rate of technical change--is bringing more problems than blessings. New Mexico, along with the rest of the world, faces decisions as to an optimum population, based on what the New Mexico environment can stand--and still support quality living. The marginal nature of New Mexico's physical environment can be a blessing, if understood and abided by. Stark limitations of water, arable land, growing seasons and rates, etc., help to make explicit healthy population/ environment ratios. In richer environments the limits tend to be ambiguous, making balanced ratios harder to quantify.

Man-made conditions push the limits of the biosphere, leading to ecological imbalance. The constructs and the activities of man must be judged against the new cost/benefit ratio--one that is at least as concerned with ecologic, esthetic, and human values as it is with standard economic values.

Destruction of landscapes results from inadequate planning based on narrow economic decisions. Environmental management must assure that all manipulations of the physical environment are based on ecological understandings, and that they are adequately funded to fit the contours and structures of the environment, rather than straight-line

across its grain.

Educational and professional specialization produces single-track approaches to the natural and social environments. The need is for synthesis and interdisciplinary cooperation to avoid out-of-context actions, whose destructive by-products cancel out intended benefits.

Institutional fragmentation and non-coordination destroys coherent thinking, planning, and development. At every jurisdictional level the specific actions of governmental and private institutions must be made to square with general environmental objectives, thus avoiding left hand vs. right hand contradictions. Coordinated environmental protection agencies, working horizontally and vertically through our society, will help to answer the need.

Lack of leadership and fiscal continuity within institutions leads to short-term plans and actions. Administrative devices, such as carry-over personnel and funding, will help set the stage for long-range planning and development.

In sum: Random, single-track, non-coordinated, fragmented, stop-and-go social processes are the norm today. The havoc they wreak is compounded by a "Multiply and subdue the earth" population ethic. In this context, how can society hope to set and attain rational goals that square with environmental realities? Obviously it can't. And the consequences close upon us in the form of Topsy-growth, jerry-built contradiction and chaos.

It is well to repeat that these archaic social processes and atti-

tudes cause our destructive interactions with natural processes. So long as we continue to venerate such irrationality we sink deeper into the soup, which means we'll have a tougher job getting out when we finally harken to the environmental imperative.

To hasten that day, environmental education--after laying the groundwork of ecological knowledge--analyses and critiques the failing social processes just described, then proposes new ones that will work in tandem with natural processes. This progression, heavily dependent on the inquiry method, produces important insights and understandings. But more important than these, it creates hope. Environmental education can convince students (and other people) that they don't have to just let the future happen. Rather, based on their knowledge of natural and social processes, they can look at the future as a set of alternatives, then they can choose the one they want, and then they can plan and take action to get it.

At this time, nothing is more important than restoring people's faith that they can control their destiny. Only then will they snap out of apathy and chart a course to the future they want.

Already it can be seen that environmental education encompasses the full range of human concerns and attributes: A deep sensory involvement precedes understanding of the natural world. The affective springs harboring our deepest emotions must flow freely to build an ethical philosophy of man/environment relationships--and to sustain the vision and the effort that lead to an esthetically satisfying future. Logic and intellect are fully challenged

to develop social processes that blend happily with nature's abiding laws.

No subject, no descipline is irrelevant to this process. Think of a humane world without the humanities, of an esthetically satisfying one without the arts, of a balanced one without the sciences. Positively stated, environmental education can be that constructive ecumenism that pulls human aspirations together to achieve a happy, healthy future $\frac{1}{m}$ for man and for his living companions on this rare and beautiful and long-suffering planet.

Amidst the euphoria and general rejoicing that accompany such a vision, many a hard reality doth lurk. Environmental education, to the extent that it deeply probes the values and operations of our society (and it is worthless if it doesn't), is controversial. Let's face it, no worthwhile discussion of environmental problems is uncontroversial. When you apply the strictures of bio-politics and bio-economics to those who are happy with the politics and and economics of expediency, you are asserting your rights against theirs. You are saying that particular organizations and individuals can no longer impose their pollutants, their tax advantages, their carefully cultivated interests upon the community at large--at the expense and suffering of that larger community.

Given the facts that students are quick to understand this, and that the open-ended inquiry method is essential to environmental education, every participating class will generate its share of heat along with light. And that heat will pervade the school community. And that means phone calls from irate parents.

Let's face another fact: In this world of flux, education without controversy has to be dead.

Traditionally, education has been society's instrument for socializing young people. Its job has been to convert varieties of young people--the products of differential nature and nurture--into basically similar adults. Education, then, makes good citizens. People who endorse society's values, live within its rules, and contribute to its perpetuation are good citizens. All of this assumes a body of commonly held doctrine about society and its values and what constitutes good citizenship.

Today, society, the value systems that define it, and the citizenship that embodies it take on different meanings for different people. Hawks and doves, for example, look at patriotism differently. The Chamber of Commerce traditionalist and the environmental activist view the business growth rate through different lenses.

A factory or a mill or a power plant means good things to industrialists and engineers, very bad things to the conservationist.

A freeway pleases suburban commuters but enrages the city dwellers whose neighborhood it destroys.

On and on it goes. Our society is in transition from yesterday's world, where most people agreed about most things, to tomorrow's world, where hopefully most people will again agree about most things. But that isn't the way it is during transition. Now is a time when new definitions struggle with old ones, a time when

new doctrines develop to meet the new conditions spawned by environmental crisis. In such a world, being an educator is difficult. If society splits down the middle, if value systems are in flux, if good citizenship means many things, then education looses its moorings. It lacks a common doctrine to instill.

But these are troubled times for everyone, not just for educators. For whatever comfort it offers, we are not alone.

There is a basic rationale for jumping into the lifeboat and pulling your weight at one of the oars. It simply has to be done or life will be lost.

Also, since education is society's incubator, it would be wrong if educators did not convey to students the why's and wherefore's of society's present travail. It is the essence of good citizenship that students prepare themselves to speed the transition to better days.

Finally, despite the confusions of present turmoil, a new societal consensus <u>is</u> emerging. That consensus is found in the still disparate but rapidly coalescing elements of the environmental reform movement. More and more people see that their particular interests must be subordinated to the environmental imperative. It becomes obvious that environmental collapse would kill us all. This transcendent peril, this equalizing threat creates a new synthesis. This is understandable. Social cohesion is often born in crisis. In this perspective the risks of environmental education change colors. In short order, the educational program that dodges these

great issues will be discarded.

All in all it is better to take risks for life than to passively submit to discard and death.

From this point on, each teacher and administrator must set his or her own level of commitment. The struggle will be hard until we pass through transition's stormy waters.

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The facts are before us. Science-based technology has gotten out of hand--at the behest of a society that for too long acknowledged only the credit side of the technological ledger. Now the debit side is catching up with us. The environment has come unbalanced. And society must begin paying the bill.

Society's attitudes toward life-sustaining natural systems must change before significant remedial action can occur. Education is the key to this attitudinal change--and, thus, to human survival. As education fostered the knowledge and the talent that unleashed man's great (but illusory) power, now it must become society's principal means for restraining that power and turning it into channels that heal the damaged environment.

The public schools will be a major force in this re-educational effort. Through environmental education the schools will involve students in the natural world, inform them how that world works to sustain them, motivate them to care for it, and activate their concern. In the process, students will exert influence upon their parents and upon their communities, reinforcing the formal and

informal processes of adult education. By the time the students go on to adult life, whether directly to jobs or via college, they will be experienced environmental conservationists, able to function immediately and effectively in what will be the major work of this nation, indeed, of the world community, for many decades to come.

It is this idealized vision of educaiton for survival that must sustain us, as educators, in this time of tooling up. It won't be long, given the public temper of environmental concern, before the laws are passed and the funds appropriated that will give the school community the sinew it needs to do the job of environmental education. Soon there will be innovations in teacher education, multi-disciplinary curriculum workshops, coordinating personnel, and ample materials to fuel the environmental education movement--right down to the last classroom. This is a certainty because environmental crisis is with us--to stay and to deepen--until we begin making amends. It is not a matter of faddishness, because environmental backlash strikes everyone and it will be some time before the momentum of environmental destruciton is reversed. The blows will get harder. They will be a constant reminder to society that it must employ every institutional arrangement--including preeminently education--in the work of environmental reform.

CHAPTER II

ENVIRONMENTAL EDUCATION TODAY--IN NEW MEXICO, IN YOUR CLASSROOM

From the way's of environmental education we move directly to the what's and how's.

First off, it bears repeating that environmental education is not an added subject to be crammed into already crowded curricula and schedules. It is, rather, a philosophic context that contains and influences extant teaching--learning patterns. Look upon it as an injection that breaks down walls between subject-matter pigeonholes, then integrates them for common purpose. Each subject contributes to environmental insights, and, by relating to other subjects, reinforces their capacity to carry part of the environmental load. For the moment--forgetting grade-level differences and the various structural boundaries that segregate students, teachers, and subjects--let us translate this nebulous concept into a working example:

A current events class tackles the problem of denatured, chemically adulterated foods (remember the recent flap over non-nutritional dry cereals?).

Using the inquiry method, teacher and students probe the reasons why eating the breakfast of chumps kept Jack Armstrong out of the Olympics. In the course of inquiry the history of agriculture and food supply in an urbanizing America momentarily takes center stage. If only a few Americans on farms produce food for the great majority

of city dwellers--who cannot produce food in their synthetic city environments--then farms must be highly efficient and mass productive. This means great spreads of mono-culture: thousands of square miles devoted exclusively to wheat or corn. And these crops must be cultivated and harvested quickly, on precise schedules. This means mechanization of the farm.

What does this new set of farming conditions mean in ecological terms? First, mono-culture is a man-caused simplification of the environment. By contrast, natural environments are complex. Many animals and plants interact, balance each other out, and make specific contributions to the life process that binds living things to the soil. No one species of plant or animal can get out of hand for long, because natural limitations of food supply and predator-prey relationships continually tend toward balance--a dynamic homeostasis. But in the simplified man-made, mechanized farm environment, one crop stands alone. It takes from the soil and depletes it. No other plants replenish the soil; no draft animals spread their natural fertilizer. So chemical fertilizers have to take up the slack. When pests strike at great spreads of mono-culture they meet no check from limited food supply and natural predator controls. So they "explode" and sweep vast areas (like 1970's corn blight in the Middle West). So man again introduces synthetic controls--massive pesticide spraying.

Upshot: Depleted soils saturated with chemicals and poisons, which produce masses of food stuffs that look good but lack nutritive value and pack accumulated poisons.

As soils continue to deplete and get "salted" from chemicals and as pests become immune to poisons, the vicious cycle deepens and men pour more and more chemicals and poisons on. Plant products still look good, but they are chemically adulterated ghosts of natural plants.

Mechanization of farmlands drives farm workers off the farms into the cities, for which they are ill-prepared. Unable to grow food in this new environment, lacking the talents and special adaptations necessary for city life, they fail and go on welfare. This sociological phenomenon produces the paradox of grinding poverty in the midst of affluence.

Meanwhile, the wheat and corn are processed and packaged. Chemicals are added as preservatives so that the foods can travel and sit on shelves until someone buys them. Because the basic food lacks natural nutrition and flavors, more chemicals are added to "enrich" them, spice their flavor, give them some oomph--turn them from synthetic paste into something palatable.

Rich and poor alike buy and eat this chemical feast. But it's worse for the poor because they can't afford proteins and other rich foods to balance out their diets. They are also largely ignorant of just how empty these adulterated foods are, even though they do ease immediate pangs of hunger. Suddently the problem becomes one for home economics, cooking, and health classes.

We could go on proliferating this example (e.g., the basic communications and moral values of food advertising), but let us stop here and

sum up. A current events headline has produced inquiry into history, into agriculture, into urbanization, into industrial distribution, and commercial processes. It has reached into chemistry, biology, and sociology. It has posed problems of individual and public health.

That headline has opened a window on man in the web of life. It has dealt with destructive interactions of social and natural processes. Full exploitation of this single topic would lead to questions about changing the values and processes of the food industry. It would explore the ecology of agriculture and an urbanized world. It would develop attitudinal and behavioral responses in students that would ramify into the home when shopping time comes. It would allow insight into the quick fatigue, lack of concentration, and poor performance of classmates who lack the basic fuel to perform well.

In this multi-disciplinary, today-oriented environmental education exercise, students have gained historical and social perspectives that aid them to brush aside slogans and simplistic balderdash. They are digging at root causes. They have seen that man in the web of life is breaking strands when he breaks nature's rules, and that he, man, is the number one victim. We simply aren't talking about the esthetics of far-away places where the bird-watchers roam. We're talking about people in daily life taking the consequences of false philosophies and mistaken acts.

In terms of units, this single example could spawn fifty of them. The whole school could pull together to move the results of student

studies into the public arena. PTA meetings and museum exhibits could be platforms for a larger educational program. This would involve art and manual arts and public speaking and research in many fields. Local colleges could be tapped for expert speakers at such school-sponsored programs. Making this kind of public education project go would throw students into the crucible of in-the-system environmental action. They would deal with local media, consumer organizations, food outlets. They would seek information from government agencies in the public health and regulatory fields. In the process they would learn where are the strong and weak points of our social processes. Who in their community is letting whom get away with what. Who is fighting the good environmental fight, and who is the opposition. The complexity and indefatigable labors of turning a society around would strike home quickly. Illustrations about idealized "civics" would be replaced by tough understandings about the world and what it takes to change it for the better. The reform impatience that flames brilliantly, then wanes into disillusionment and drop-out, would transmute to dogged, long-term durability.

Now, using current resources, how does a teacher, a school, a school system get cracking on this kind of environmental education action?

The essence of getting started is...getting started. If within a school or school system committed individuals come together and unite their concerns during staff meetings and breaks, they can reinforce each other and create a climate for environmental educa-

tion innovations. This manual cannot prescribe the details of this process, because each teacher, school, and school system has particular strengths, levers, and personal-personnel resources that should be exploited in the local context. Given commitment and desire to embark on environmental education, local adaptations and modes will be found.

But a general outline of getting-started procedure may be useful, subject to variations that work for you:

FIRST, assuming that each school and school system has at least a few gung-ho environmentalists, this cadre of people should choose from among themselves an environmental education coordinator to act as spokesman and liaison. His or her job is to refine the group's environmental education potentials into specific approaches and projects that the administration and the school board can evaluate and support. Particularly important here are approaches that cross subject-matter and departmental lines. For these are the approaches that enrich and pool environmental education efforts.

SECOND, upon getting support from administrators and the school board, press for their sponsorship of workshops that inform the entire teaching and administrative staff of the need for environmental education, the administration's support, and the means for accomplishment proposed by the environmental education cadre.

THIRD, use PTA meetings, parents' nights, Education Week programs, and other public-contact events to inform the school

community of the why's, what's, and how's of environmental education as proposed for its school and school system. Model student projects and products are critical ingredients in such community relations efforts.

These rudimentary steps are designed to break the inertia of attitudes and modes that lock the educational process into the "Read Chapter 26-recite-quiz" pattern. The State Department of Education is well aware that Chapter 26 must still be read. It is aware that pending fundamental reform of curriculum, textbook, schedule, and test requirements, environmental education must work its way into a maze of traditional patterns. But it encourages and morally supports those teachers whose initiative transmutes these set patterns into vehicles for environmental education. Really, this is the teacher's challenge: to find the room for maneuver, the interstices in current patterns that open up environmental education opportunities.

The objectives of environmental education have been implicit throughout this manual. In most basic terms these objectives are: to involve the student in natural processes so that he understands his part in and dependence on them, to bring him to awareness of the social processes that impinge upon natural processes, to motivate creation within himself of an environmental ethic, and, finally, to activate his ethics-based concern. In this process he comes to understand that man/man relationships are as important as man/environment relationships in achieving a healthy total environment. Implicit in this set of objectives is an important

corollary: the student's concern over the big picture of environmental crisis and needed reform must be matched by opportunities for immediate, attainable environmental reform expression and action--else the problem becomes overwhelming and kills the motivation for constructive involvement. This "brighten the corner where you are" approach opens the door for students to practice environmental reform on their own scale of operation--to experience the feeling, through action, that they can be a determining force in shaping the future, rather than passive victims.

The basic conceptual design for environmental education hinges on inquiry method, concepts, and settings.

The inquiry method starts with questions. The teacher's role is not to give the answers but to create a context--through evidence, discussion, and discovery--that motivates students to their own conclusions. If the topic is the human ecology of providing food for increasing populations, one question would certainly relate to the "green revolution" (development of plant hybrids and agricultural techniques that increase crop yields). What are the pro's and con's of the green revolution? Getting answers to this question would involve much conflicting evidence. Ecologists would stress the detrimental effects of heavy doses of chemicals on the soil. Agronomists would tout the potential for feeding mass populations. Demographers would assert that increased crop yields buy only a little time in the race between food production and people production. Out of this mix of evidence, students would discover that the green revolution is no panacea; but it can give

the world a little more time to institute effective birth-control measures; but even that time will be bought dearly in terms of soil damage.

From these initial conclusions students could draw up their own version of environmental cost/benefits, whence they could evolve environmental principles. Such as, there are no free lunches in environmental affairs--mankind always pays a price for altering natural processes. In this case, are the social benefits worth it? And so on.

Whatever the subject-matter vehicle, certain fundamental concepts pervade environmental education. At a recent environmental education conference in Portland, Oregon, Dr. John T. Thomas of Stanford University elaborated on these concepts in a way that perfectly illustrates natural-social process interactions. I quote him at length:

"Now I am personally not an expert in curriculum although I can give you Thomas's rules of curriculum revision and I think they are applicable. First of all, you can't possibly teach anyone everything we would want him to learn. Life is too short for that especially considering the small amount of time we have children in school. Second, no matter what we decide to teach, a particular group of people is going to criticize and say you are teaching the wrong concepts. And the third rule of curriculum revision, so far as I am concerned, is that one can't get too concerned about creating the perfect curriculum because there is no such thing. My general idea of a good curriculum is one in which there is constant change and in which there is experimentation--if you try something and it does not work you try it a different way.

"I think many of these ideas I shall mention are so very important that they must be gotten across in class in some form. Even though we may at times get parental backlash we cannot really leave some of these things to parental blundering. I think we simply have to step, even if we don't want to, on parents' toes when they start complaining. In other words let's not have society suffer because

a few parents don't want certain ideas presented.

"Well, the first concept that I think you must get across to youngsters is the idea that this little world we live on is a finite one. Over and over again I get comments from people, from youngsters and adults. As they come across the country they see all that empty space and assume just because it is there and it is empty it can be used. They do not have the concept of "finiteness of space." We have, after all, something on the order of 200 million square miles of land surface on the earth and that's it! That's all we have! The world is a closed system. Yes we can get energy from the sun but energy is re-radiated! A lot of the energy from the sun came to us in the past! It is of course what we are using up now at a very great rate.

"I think the concept that the world is not only for mankind is another concept we must get across. There are something of the order of 5 million other kinds of living things in the world. Biology curricula have not in the past emphasized this very much. And all too often when we portray these ideas, we do it in a sort of a cute, Disneyland movie which somehow puts it in an unreal light. The role of man as the dominant species is something we should begin to get across. We are not creatures which are exempt from nature: we are a part of nature - in the final analysis nature is always at bat last.

"When we consider the five million kinds of living things we also have to get across the idea that every organism that has ever lived used a proportionate part of its surroundings; there is no question about that. We use our surroundings: this is simply a part of the system that we cannot avoid. The rub comes of course when we over-use the system, when we over-use our surroundings, or when there are too many of any one kind of organism.

"And I think we have to present the earth as a system and that it is composed of a series of systems in which there are relationships in systems and tnere are relationships between systems. The state of California is a system. Coastal sand dunes are systems; a redwood forest is a system; a Douglas fir forest is a system; a school is a system; a family is a system; and you and I individually are systems. Within any system there have to be relationships, there have to be forces acting which tend to keep that particular system functioning. A good system is one which will function for a long period of time. There is no such thing as a system which will last forever! None of us will last forever and we know that at some time the world will cease when the sun runs out of its hydrogen.

"But over long periods of time a system tends to remain stable and much of the activity which goes on within it maintains it as a stable system. A beautiful example of this is the United States Congress. This system is a very stable one and a great deal of effort is expended to keep it in exactly that same way. A system then needs stability in order to continue to function. On the

other hand a system which is so very rigid is apt to eventually come crumbling down around itself. So we are faced then with the need for stability on one hand and flexibility on the other. A good system then is one which is sufficiently flexible, sufficiently rigid, sufficiently stable and has practibility within it so that it can change with time. The rub, of course, comes in trying to maintain that balance. To talk about extremes, that's easy! Where the two meet, that is of course the complicated part.

"But I think that most people probably don't conceive of systems in this way. I can understand some of our most militant younger colleagues and their frustrations when they see that many systems are so very rigid. They think the only way to change things is to tear them down. Well, perhaps in the past this was the way to do things but I am pretty much convinced now that we don't have time to tear down our systems whether they are political systems, social systems, or educational institutions and rebuild them. In the struggle to create stability out of instability a lot of the problems we are concerned about probably will not be dealt with initially. Those, I think, are rather basic considerations of the world in which we live. In some way they must be gotten across to people and of course we are talking about school children, specifically.

"One other important area we've somehow got to get across in better fashion than we have is the meaning of ecology. The word "ecology," in the strict academic sense, means that field of study or that science which deals with relationships of living organisms to their surroundings. Ecology then has actually become synonymous with the word "environment." I use the word "surroundings," as you see, in preference to the word "environment" because as I have already hinted people who use the word "environment" think that they can fool you when they talk about good environment. Really what they are talking about is a man-made, man-oriented, man-centered environment.

"To be an ecologist is a very, very difficult task because of the number of diverse areas involved. In the strict sense there are very few ecologists in existence. We have, for instance, only one person on the staff of the faculty in biology whom I would consider an ecologist. Yes, we all know something about ecology but our primary thrust is not in that direction.

"Briefly, let me indicate what I think are the principles of ecology because I think these are important ideas to get across to students. If we were to go through almost any high school in this country and ask every third student what ecology is, one would get the most horrible, garbled, invalid answers you could imagine. I put the principles in the following way: first of all, we cannot create anything and we cannot destroy anything. All we can do is change things. So when we did as we did in Central California recently, that is ban most burning, we must now haul debris out to the dump, creating another problem. In the days when

we burned things, we weren't really getting rid of anything; we were simply changing it to carbon dioxide, water, ash and so forth. So we cannot create anything and we cannot destroy anything. There is nothing that we can flush down the sewer as it were. The oceans, lakes, streams and rivers are not infinite sumps into which we can put things, whether pesticides, fertilizers or heat.

"Secondly, there is no such thing as a static system. There is constant change within any system, within any part of the surroundings.

"The third principle is that when we change something in one part of our surroundings it will affect the environment in some way. The greater the disturbance to a particular part of our surroundings, the more widespread those effects are apt to be. If we, for instance, cut down one tree on a slope, there will be some local rearrangements of plants and animals for a while, but this will not spread much beyond the confines of where that tree was cut. If, on the other hand, we cut down a whole forest on a hillside, all the trees, we are going to not only possibly prevent that forest from regenerating, we are undoubtedly going to have increased erosion and runoff, as well as changing the weather pattern slightly, especially in regard to winds. The effects of this are going to be felt at quite some distance. When we think of some of the mass engineering schemes that have been proposed and are being built, such as the Aswan Dam, the effects of those projects are going to be very, very much more widespread. We think of such projects as a sea-water-level canal across the Isthmus of Panama which has been contemplated in some circles. The effects of that will extend much beyond just the trench that is dug. The mixing of the vegetation and the fauna of the Pacific and the Carribbean will produce results that people can scarcely anticipate.

"The fourth rule is that every system has a buffering capacity or a carrying capacity but this carrying capacity, like the world itself, is not infinite. We tend to think that we can dump things into the ocean as though the ocean is infinite but indeed it isn't. The air is finite also. Looking at pollution from this point of view, we see that we are simply exceeding the carrying capacity of some parts of our surroundings. The carrying capacity also applies of course to the population size of any organism that we want to talk about. In any particular situation there is a carrying capacity or a buffering capacity for population size.

"The principles of ecology are basically pretty simple. Being an ecologist, as I have said, is very difficult. Along these lines we also ought to get across to people, in a realistic way, what food chains are all about. The intricacy of food chains, food webs, food pyramids, and something about how energy flows through an ecosystem, which probably is not appropriate for first graders but may be appropriate for tenth graders. The concept of carrying capacity with specific examples could be put in any number of ways. How many acres does it take to support one cow in different

situations? These very practical examples could get across all of these ideas. Predator-prey relationships and cycles of predator-prey relationships are important to get across as well as the complexity of nature and interdependence of things within systems. The concept of the ecosystem - we really have to consider the whole world as a commons, and when we increase our use of the commons a bit over the next guy, we may be richer for the time being but in the long run everybody is poorer on the average. So the whole concept of ecology--what ecology is, and what ecology isn't--I think must somehow be got into the curriculum and particularly on the principles level.

"Another very important point that must be expressed over and over again is the relationship between human population and environment deterioration. This is one of the points that is not currently stressed at all adequately so far as I am concerned. I usually put in the form of an equation the relationship between population and environmental deterioration. The population we have in the world today is 3.6 billion and increasing. In the world today the average growth rate is 1.9% per year. We add 68.4 million people to our planet every year plus very high living standards in parts of the world. The United States, for instance, with 6% of the world's population uses something between 1/3 and 1/2 of the annual production of raw materials of the world, per year, plus rising expectation for higher living standards throughout the world. In summary then these are the four factors which contribute to environmental deterioration: the population we now have; the increase in population; the high living standards in parts of the world; plus the rising expectations for higher living standards elsewhere in the world. Now when one looks at that equation - whenever we talk about any of the aspects of environmental deterioration whether it is air pollution, problems of the inner city, problems of noise pollution, heat pollution or pesticides - the one component we can never reduce to zero is population. We can simply not be more matter of fact when we talk about these things. It's fine to clean up air pollution, but yet if we don't consider the population aspect of this, all we do is fight a losing battle.

"Now, most of us do not want to admit that people cause pollution. I have argued very vigorously on this subject. But you will find that the great majority, like about 99.9% of those who are concerned about population and environmental deterioration would agree in essence with the equation that I just gave you, that is the relationship between population and environmental deterioration. What we are really doing when we increase population is to make every single system that we deal with more complex. Hence, the problem is greater in terms of solutions and it may indeed get to the point where the size of the population is such that it precludes solutions to some problems in other than very drastic means.

"In addition, I think we should try to get across to students something about population distribution, actual facts and figures

about population numbers. I know for some people to say that 3.6 billion people inhabit the world probably doesn't conjure up any sort of threat, but there are ways of getting these ideas across. I am currently involved with two local high school teachers near where I live in trying to design a game. It's quite an interesting game attempting to show the relationship between population and environmental deterioration. It is a three stage game; the first couple of stages follow certain suggested rules. In the last stage you make up your own rules in any way you wish but winning is impossible. All you can do in the area of population stabilization is to simply buy a few more years of time. Perhaps this is a way of introducing some of these important concepts at different levels. When we talk of population we have to get across the notion that at some point population must stop growing. I don't think we want to scare youngsters by saying they face starvation, war, famine or disease. But in some way we've got to persuade them that there have to be limits to population growth. Some of these concepts may not be what we are usually taught because they are counter to humanitarian ideas and ideals.

"We tend to put man first in the world and everything else takes second place. We don't really appreciate our reliance on the rest of the living world. We could not exist if we did not have Escherichia coli in our intestines just as an example. Perhaps juniors and seniors in high school could begin to appreciate the philosophical outlook that has put us into the mess we are in today. Obviously a realistic discussion on environmental deterioration, its dangers and possible solutions should be stressed. Again, I don't think we should scare students out of their wits but yet I think that these ideas can be inserted in the proper way and at the proper time.

"I think one of the most essential things - and exactly how you implement this I am not sure except to keep plugging away at it - is to insist that by the time a youngster gets to the age of puberty he knows the facts of life realistically and that he knows how to prevent conception. It's a bit discouraging as I travel around to find that the illegitimacy rate in that particular school is five per cent for girls age 13, 14 and 15. It's no use closing the barn door after the horse is out. I think this is so very important that even if parents complain, society has the right to take responsibility from them if indeed parents do not wish to do anything about this. It's been my experience that the parents who do the best job of teaching their children about sex education are the ones who welcome the reinforcement that comes from a good course in school. The parents who know the least and do the worst job are those who complain the loudest. I've looked at some of the educational television programs and films concerning this matter and I see absolutely nothing objectionable in them even for very small children.

"We tend, when we look for the solution to a problem, to hope that there is going to be a simple one, only to find that from a

systems point of view there are no simple solutions.

"I think we've got to very critically re-evaluate and express in different ways what science is all about. I was taught both at Cal Tech and Stanford that as a "scientist" I was supposed to do whatever the experiments led me to, whatever my reasoning led me to, and not worry about anything beyond that. This somehow was somebody else's responsibility. Well, I've completely disavowed that concept of science. I think no one should be engaged in scientific activity unless he is very thoroughly aware of the social consequences of his activity and possibly even the social costs. Just because something is possible, this is not necessarily reason to do it. This to some people will sound like a very unscientific or anti-science attitude. I don't think it is. I simply feel that we can no longer afford to have scientists live in ivory towers absolving themselves of what they create. Furthermore, when it comes to governmenr support of science we've got to start looking at it in terms of priorities. Also the concept that science and technology will solve all our problems if we just wait long enough is a pretty self-defeating proposition.

"What I really think we must do is to change the thrust: we must change some of our most cherished and fundamental beliefs. We have, for instance, grown up to think that growth is good. Now we are faced with the problem of accepting that growth per se is not necessarily good. This is not an easy thing to do. We tend to glorify the biggest, the best, the tallest, the fastest and the richest. I'm saying yes, up to a point, growth is good but beyond that point it's bad. We must expose not only one side but both sides of this issue. We have also tended to think that quantity is good and have ignored the matter of quality. We've taken great pride for instance in the fact that in this country today we have hundreds of millions of automobiles. We express pride in this but we rarely talk about the quality of what we produce. This is not an easy concept to get across but I think it can and must be done.

"Another very important change which parents will confront is the whole question of family size. We have assumed to date that it is the right of the parents of this country to have as many children as they can afford. We must now ask the question in a different way. How many people <u>in the world</u> are there to support and what is our share of that? My personal opinion is that two children per family for the next five decades is probably one too many because thirty-one per cent of our children are under fifteen: they have not reached their reproductive age. The population of the United States, assuming two children per couple right now, would not stabilize for about fifty years. These are very difficult things to get across and yet I don't think we should let parental teachings in these matters stand in our way. It's much too important to let blundering parents keep us from getting the message across.

"I think one of the most critical problems - this is why in many ways I believe education has failed us in this country - is that we have not provided most people the tools, the faculty, or the understanding of how to take a set of facts and come up with an objective evaluation of those facts. We still as a nation tend to act on emotion rather than reason. Despite all the training we have, it is very difficult to get people to look at facts objectively, unencumbered with emotion. Yes, there are whole areas of our lives where we can permit emotions to guide us. However, there are other areas in which we cannot afford this luxury."

The settings for environmental education are of two main sorts: in the classroom and beyond it. In a moment we will explore the settings for environmental encounters, using scenarios and examples that get down to the nitty gritty.

But first a digression on a more basic kind of setting--the working context of the individual teacher--which will largely determine the potential for a coordinated unfolding of the stages of environmental education:

Ideally, environmental education should be a coordinated progression--curriculum-integrated and multi-disciplinary--from preschool right on through college and graduate school, to be followed by formal and informal adult education. Laws and curriculum proposals at the national level and in many states (California, Michigan, and New York among others) indicate that such comprehensive approaches soon will be the norm across the nation.

Meanwhile, within each school and school system in New Mexico, ad hoc efforts can begin now to approximate and foreshadow this ideal--from grade one to grade twelve. Within each school, the environmental education coordinator, working with his or her cadre of

specially interested teachers, could develop a conceptual frame for a coordinated progression. A district coordinator could work with coordinators from individual schools--representing the 1-12 grade span--to further meld school, grade and subject-matter efforts.

It is understood that coordinators and cadres will, at this time, be donning another hat, and that their time and energies will be limited. Thus, only a basic frame is possible now--to be filled in by informal consultation, cooperation, and shared experience amongst teachers.

Getting hung up now on detailed plans and too-ambitious proposals would kill the initiative of individual teachers and postpone indefinitely the beginnings of environmental education.

It bears repeating that this manual emphasizes the possible and the now. Therefore, these suggestions for coordinated effort are not intended to interpose a procedural block that stops the individual teacher from getting started. Rather, they are set forth so that specially interested teachers, schools, and school systems can take full advantage of present resources.

In this time of disparity between need and resources, each individual should assess his or her working context as to potential for coordinated environmental education. Some contexts may be inherently rich because of administrative climate and the commitment of teachers. In this event, working toward a coordinated progression within a school, even within a whole system, would make sense.

Other contexts may pose too many blocks and the individual teacher might have to work pretty much alone. Pending that day when funds and personnel allow a comprehensive, state-wide program, such local variations on the environmental education theme will be part of the game.

The basic point is, do what you can--alone if necessary--hopefully with others who share your commitment.

Whatever your working context, the stages of environmental education exposures and experiences follow a similar functional sequence.

Stage One functions as a bridge, taking the child from his home milieu, where man calls the shots and nature is simply a taken-for-granted backdrop, to a milieu where nature calls the shots and man is a visitor.

The first essence of environmental awareness is knowledge of something so simple, and yet so profound--and so obscured by man's attitudes and constructs--that most people haven't ever thought of it: The world doesn't need man. It runs quit well on its own.

Until this profound perspective becomes an integral part of a person's world view, that person will be unable to escape the false attitude that nature exists for the convenience of man. Until this attitude is seen as a myth, mankind will continue to act on the assumption that man's proper business is the "control of nature."

In reality, the very opposite is true. Nature controls man. Nature is antecedent to man, as is the mother to the child. Nature is a

total system encompassing all of its parts, including man. Nature's laws are the ultimate laws, and man, along with all other species, is subject to them.

Until students are given opportunity to discover this reality, they cannot relate validly to the rest of the world.

From conception to birth, the human fetus recapitulates the history of man's biological evolution. It begins as a single cell, then becomes fishlike, then like a lower mammal, and finally it assumes human form. Figuratively, environmental education recapitulates man's socio-cultural evolution within nature's womb: A world without man; then early man getting a tentative foothold in the life community; then the swift evolution that began with agriculture and the first cities, leading to modern technological man.

Stage One of the environmental education process takes children back to dawn times so they have a chance to see how much a part of nature they really are.

Stage Two deals with man the tool-wielding manipulator of the physical environment. All of the questions in this stage stem from this very basic one: What is the relationship between man's assumptions about the world and his place in it, and the facts about the world and man? Answers to this question, in all its variations, are found in the consequences of man's acts.

At this point man ceases to be a single entity and becomes the many families of man--each family (or culture) identified by its own set of assumptions and acts and consequences.

Historically, some cultures have conformed to nature's laws. That is to say, their assumptions about the world and man's place in it squared with the facts about the world and man. Their acts produced consequences that did not disrupt the natural order. Other cultures, their assumptions at odds with the facts, disrupted the natural order

Today, despite the homogenizing influence of world-wide technology, some men still try to live harmoniously within the natural order, obedient to its laws. Others, igrorant or disdainful of the natural order, destroy it.

The essence of State Two is exposure to another major perspective--another simple but profound notion: Different cultures have evolved alternate value systems by which they have ordered their relationship with the natural order. And this understanding has its corollary: Judged by the criterion of the health of the social and physical environments, some value systems work and some don't.

Stage Three capitalizes on the notion of alternate value systems. Simply, value systems determine acts, acts determine consequences, consequences determine the kind of world that men live in.

By now the student knows that the natural order is basic in this world, that man is a derivative of that order. He knows that nature's laws are constant, that man's laws (assumptions, value systems) can vary.

With these perspectives, he is equipped to conceptualize a future in which man--the derivative, the variable--can adapt himself to that which is basic and constant.

He can visualize social processes as a key, the natural order as a pre-existing lock. Reading the structure and the processes of the lock, he can cut the key to fit.

This conception is pre-eminently a philosophical world view. It is not a detailed plan. The natural order is flexible enough to accommodate many keys--many versions of the good life. But all variances must respect the basic tolerance of the lock; that is they must meet the criterion of conducing to the health of the social and physical environments, expressed as the harmony of the total environment.

Now the student has a basis for judging the acts flowing from the social processes that surround him, of which he is a part. And, now, he is ready to translate his understanding into action. Those acts that conserve or regenerate the total environment, he can endorse. Those acts whose consequences would disrupt the environment, he can challenge. And in the great gray area where consequences appear dubious or are unknown, he can insist upon environmental evaluation before the causative acts are allowed to occur.

In sum, the stages of environmental education break through culturally induced illusions and assumptions that heretofore shaped the student's view of the world. They give him fresh perspectives of nature, of man, of the future. From this fresh base he can discern what is real and constant, what is illusory and temporal. He can balance true necessity against the false necessities of cultural lag. He can choose for himself.

All stages of the environmental education process require a balanced involvement that taps the student's intellectual, sensory, and emotional attributes. Cold operational knowledge is not enough.

For example, the complexity and the subtle relationships illustrated by natural phenomena spur the admiration of the intellect. Textures, patterns, smells, and sounds--the play of light and shadow on running water and tumbling waves--these stimulate the senses. The beauty, the strength, the fragility, the rareness of life--the uniqueness of each of its embodiments--these open the heart to love and companionship.

Indeed, the soul of understanding lies in the human capacity for appreciation and wonder. Nature's moods and harmonies and mysteries reside within each student, for, as a part of nature, he is their product.

It is the essence of the beginning of environmental education to plumb these depths--to help the student reactivate the natural being in himself. Social processes have conspired to insulate all of us from the natural world of which we are a part. They are inhuman and dehumanizing precisely because of this. A revised treatment of that world--and of each other--hinges on regeneration of that part of our souls atrophied by insulation and disuse.

That is why biologist-philosopher Rene Dubos insists that environmental wisdom begins only when we fulfill the "biological and emotional need for an harmonious accord with nature." (Quoted from So Human an Animal.)

Only then can we revere the natural world and love our partners in life. Only then can we cross the artificial threshhold that locks us out of the natural world. And only then can we conceive the ethical basis for constructive citizenship on the good ship earth.

Psychologist Erich Fromm, in his book The Heart of Man: Its Genius for Good and Evil, describes the polar attitudes men hold toward life: "biophilia" (love of life) and "necrophilia" (love of death). He quotes Spinoza: "A free man thinks of death least of all things; and his wisdom is a dedication not of death but of life." Yet, as Fromm asserts, the necrophile, his soul truncated, is increasingly the product of modern technological society. He

> has more pride in, and is more fascinated by, devices that can kill millions of people across a distance of several thousands of miles within minutes than he is frightened and depressed by the possibility of such mass destruction....
>
> If more people became aware of the difference between love of life and love of death, if they became aware that they themselves are already far gone in the direction of indifference or of necrophilia, this shock alone could produce new and healthy reactions.....
> Many might see through the pious rationalizations of the death lovers and change their admiration for them to disgust. Beyond this, our hypothesis would suggest one thing to those concerned with peace and survival: that every effort must be made to weaken the attraction of death and to strengthen the attraction of life. Why not declare that there is only one truly dangerous subversion, the subversion of life? Why do not those who represent the traditions of religion and humanism speak up and say that there is no deadlier sin than love of death and contempt for life?

Thus endeth the reading. Now back to the settings for environmental education.

Settings are combinations that help students develop their environmental philosophy through encounters with people, institutions, places, and media.

It is not the purpose of this manual to present endless lists of these components. The next and concluding chapter, Readings and Resources, contains guides and lists for that purpose.

Rather, we will here share a few exemplary combinations, adjusted to grade level, to serve as models and analogs upon which teachers can build--adapting them to available resources.

The classroom is where it all begins: a teacher, some students, and the abiding urge to understand and be effective in this world. Often, because of budget limitations and restrictive rules, the classroom will be just about it, in terms of place. But with the aid of people, institutions, and media, the world can be squeezed into the classroom. Anyway, the classroom itself is an environment. Let's take these two aspects of the classroom--itself an environment, a microcosm of the world; and, by way of imports, a repository of the world out there--and use them as bases for environmental encounters in the primary grades.

These students spend lots of time in this classroom. They must have some opinions about it--as an environment that closes them in for some hours each day. A basic technique in environmental education--as in all other kinds--is to have the students themselves structure their environmental encounters.

What, in this room is pleasing or displeasing--as the children see it

How might they emphasize the one, de-emphasize the other? What are the possibilities for artistic embellishment of the physical environment of this room? How might poetry, or a song, or the arrangement of desks and tables smooth the social processes?

Why not start by having the children inventory the physical aspects of the room, and the social processes that go on there? Then they could express their views on what is good and what is bad. This identifies problems. Problems cry for solutions. What are the children's solutions? And how can they organize and discipline themselves to accomplish them? This leads to revised social processes, based on leadership, skills, and imagination.

The children may have a window in their room. Maybe they want to face it instead of the blackboard. What are the pro's and con's of this? Evaluation develops the concept of environmental costs and benefits. Maybe they could face the window at certain times!

Is the heat too high? The air too stuffy? Could the janitor be invited in to hear a student petition on this matter? This calls for tact and good community relations.

Meanwhile, this environmental encounter--where the children live, not out there--has used every attribute, every skill the children possess. They have observed their classroom world. In response to the stimuli it offers, they have expressed their feelings and their opinions in art, in language, in music, in mathematics. They have experienced social interaction amongst themselves, with their teacher, and with at least some members of the extended school community.

Most important, they get experience in questioning the "givens" of their (classroom) world and choosing an environment, a future, more to their liking. They have become active participants in the world's work.

As they say, environmental education is education for life.

(Before dropping this idea, let's extend its principle beyond this primary classroom: How many new schools have you seen or taught in recently? And, if they are like most new schools, architecture has used up the construction budget and landscaping has been forgotten or been an afterthought--known as the sprinkle-some-grass-seed syndrom

Bare, buffeted by wind-blown dust, the school yard--the context of education for life--is a travesty of quality environment. In some schools (e.g., Santa Fe High School) students organize themselves--and the community--to rectify such environment mismanagement. They enlist their parents and their parents' friends in this effort. A landscape architect draws up a landscape plan. A nurseryman contributes plantings. The students raise money by collecting paper, aluminum, and other "waste," to be recycled into the production system--which shows how one environmental reform objective can be hitched up to another. Community work days bring students and parents together to do something about their community environment--as symbolized by the school yard.

(Beyond-the-school yard extensions of this principle are obvious.)

Now, back to the primary classroom--this time as a setting through which the world "out there" parades.

For years you have imported the world into your classroom, using people, institutions, and media. Now, consciously seek out environmentalists and environmental orientations for such activities. Hit up the public relations offices of local institutions, agencies, and businesses--the power company, the water authority, the college, the county agent. They have talks and films and brochures. They are on the environmental bandwagon and will talk environment. As a preliminary, turn your students loose on environmental aspects of the topic--say, power production, distribution, and use--so that they are prepared with questions reflecting their concerns.

Inventory the work and professional affiliations of parents. Some may be doctors, lawyers, engineers, garbage collectors, laborers, ranchers, or farm workers. What about public health in this environment, environmental law in this community, environmental management of road-building and constrauction, waste disposal, environmental safety in the mill or factory, range management, use of pesticides? Through the students, invite these parents in--most would get a good feeling from participating in their child's class work.

A variation of the world-on-parade theme would tap the students' esthetic preferences: Of all the places in the world, which do you think most beautiful. Assume that they select one--from a pot of picture suggestions that they have gathered--what illustrative, audio, story, music associations could be brought into the classroom to put flesh on the concept of beauty? How might they express their response to this imported beauty--through stories, art, music, poetry, of their own? What setting could they use to convey their feelings

to their parents--PTA, local museums, parents' night, etc.?

The experience of beauty is terribly important--not a side line at all. Our urban world, especially, is almost devoid of beauty. Without esthetic experiences, part of the soul dies, esthetic standards are debased, esthetic aspirations don't get born. Upshot: a new generation without a notion of the esthetic of quality environment.

Now let's move out of the classroom and take a tour of our community. Kids like some things, don't like others. Here we have the beginnings of an environmental inventory of this community. In some places this sort of experience has been the germ of an environmental essay contest--which could involve the whole school, the whole community.

Is there a local museum, a library, a town hall? Could this be the place where community leaders might assemble to hear selected essays and see supporting art work, to judge these efforts and bestow prizes? All answers are yes.

Adults might be surprised at the sensitivity of their youngsters. They might even be moved to improve their community to meet the high standards of children mercifully unconfused by zoning ordinances, politically inspired variances therefrom, and the "practical" arguments of economics!

Enlisting participation of community leaders and institutions will take some work. Logistics of the tour, arrangements for presentation night, and provision of prizes (which should have an environ-

mental twist) will require public and school administration cooperation. So the community's participation should be at the sponsorship level to grease the skids for you and the kids. How about the Chamber of Commerce, a service club, a local conservation group? Phone them up and see!

Many's the game that can be played in this essay contest. For example, one child might write his essay from the viewpoint of an ancient Indian or explorer who has, Rip Van Winkle-like, returned to this time and place ("When I first came here...Now I see..."). Another could take an artist's view. Another, a scientist's. Another could be a businessman. Another, the mayor. Another, a playground superintendent, or customer. Another someone who likes to ride her bicycle downtown, or walk from place to place without getting killed on the freeway. Another, a patient with respiratory illness. And so on. (This principle of putting on different glasses can be used in many contexts and activities.)

Another angle on the essay contest (and related activities) is to take advantage of already-existing institutional programs. For example, the Museum of Albuquerque has sponsored environmental film festivals and has produced a remarkable AV program on the good and bad points of the Albuquerque environment. It would be a simple matter to schedule these public events to complement the essay contest. A phone call and a meeting and some joint publicity would set it up.

Community tours are not new, nor are the community resources that you have traditionally used. The viewpoint and the mode of use

are new. If you take your children to a zoo, or a museum, or a botanical garden, or an aquarium, do some pre-tour prepping your children. The point today is not simply to see a mountain lion, an Indian diorama, a tree, or a trout. But to get the zoologist, the curator, the botanist, or the guy who knows about fishes to explain the environmental implications of the seeing experience. What does it take for a mountain lion to live? Are there still some environments around that meet these conditions? Prehistoric pots and weaving say things about people in their environment. For example, the ancient Pueblos could make it in places where modern men would starve--because they knew every last thing about their environment and its products, and they knew how to tread lightly when they used the environment, instead of tearing it up the way we do. Trees die when they breathe too much carbon monoxide. What's that mean for us? Just how clean should a stream be to support trout (and kids who want to swim)?

The outdoor classroom opens the gate on many environmental education experiences. A number of Federal agencies are experimenting with them. And, because Federal land is a big chunk of New Mexico's out-of-doors, you should have one of these classrooms near you. If the Feds don't have one, pressure them to get one!

I know more about National Park Service (NPS) programs than about those of the U. S. Forest Service and other agencies, so I'll use the NPS as examplar. But whichever agency, the idea is basically the same.

The Environmental Study Area, to quote at length from the NPS blurb:

> "is a nationwide cooperative environmental education endeavor of the National Park Service and local educational communities. The program uses Environmental Study Areas located on Park Service lands and the regular curricula of participating schools, to help do these things for school children:
>
> 1) Introduce them to their total environment--cultural and natural, past and present--and help them realize that they are part of it;
>
> 2) Develop in them an understanding of how man is using his resources;
>
> 3) Equip them to be responsible members of the world they are shaping and being shaped by.
>
> "An ESA provides a new kind of environmental learning experience that makes imaginative use of both the cultural and natural worlds, as they combine to make up the Environmental Study Area. ESA's also act as models to inspire establishment of similar sites outside parklands--areas which are nearer to participating schools.
>
> "Some Environmental Study Areas are primarily natural. They are located in park areas whose significance is natural or scenic. In them are exemplified the elements and forces and balances out of which man himself is made, and out of which he spins his cities and society and culture. Everything man is, or builds, is "nature" before it is anything else.
>
> "Other Environmental Study Areas are primarily historical. Many of them became historical or cultural landmarks because of certain natural environmental factors--a rise of ground that formed a logical battlefield, or a desirable landing site along a river that grew into a national gateway to the West. In such places, a child learns to recognize how the environment has affected man's development and how man, in turn, has affected his environment. The environment and the individual become an indivisible whole--a reality whose meaning for each person lies in his own involvement.
>
> "If we, who are ourselves a part of nature, are to manipulate the materials of nature toward our uniquely human ends and to do so with creative rather than destructive consequences, then we must understand and work within the laws of nature. The child who would learn this lesson must approach it with the idea that he, himself,

is as much a part of the natural world--as subject to its laws--as are the trees, the mountains and the sea.

"An ESA can be a doorway to this realization. It shifts the focus of environmental awareness from 'out there' to 'here'--from 'them' to 'me'.

"Teacher workshops, conducted by National Park Service personnel in cooperation with the local school system, introduce you to the Environmental Study Area. Teacher materials provide a narrative listing of the area resources with suggestions for adaptation of the on-site experience to the entire range of curriculum.

"At the workshops, emphasis is placed on dynamic interpretive concepts, or 'strands,' that bind the child's total environment, helping him see the relationships that exist throughout the universe--from the farthest galaxy to his own living room. The national Park Service supplies you with information on the strands, the workshops show you how to use them, and you decide how they best fit within your curriculum.

"The strands are the constants that run through the web of life and give it the satisfying order that is sometimes called 'balance of nature'--a balance mankind seeks to emulate.

"These strands plus the ESA site resources are not a 'subject' to be added to your teaching load. Instead, they are an endless source of lively new approaches to any and all of your present subject areas. The environmental strands can be applied to art, music, mathematics, history, social sciences, communications. Your use of this rich study resource will be limited only by your enthusiasm, inventiveness, and ingenuity.

"The goal of the National Park Service Environmental Study Area Program is to create an environmental awareness that will lead the individual to a personal sense of involvement, and eventually to the shaping of an environmental ethic to guide his behavior.

"ENVIRONMENTAL STRANDS

1) Interaction and interdependence
2) Variety and Similarity
3) Patterns
4) Change and Continuity
5) Adaptation and Evolution"

The ESA is used on a day-visit basis (though a series of visits, each one linked to a different environmental theme, is part of the

plan, too). Another phase of the NPS program, National Environmental Education Development (NEED), involves a week-long camping residence in an NPS area. (The Albuquerque Public Schools have used NEED at Bandelier National Monument.) In time, NEED will be a K-12 environmental education system. Now it is available for grades 3 through 8.

To take advantage of ESA-NEED programs, contact your nearest NPS area, or write to the National Park Service Regional Office in Santa Fe. And check with other Federal land management officers near you for similar environmental education programs and facilities (e.g., your nearby Forest Supervisor or Ranger, or the U. S. Forest Service Regional Office in Albuquerque).

The hope is that every community will be inspired to develop its own-backyard Environmental Study Area. Albuquerque has already done so. Your local school system can get more information on this whole business from the State Department of Education, including possibilities for ESA-development grant money from federal sources. John Cox, Environmental Education Coordinator for the Albuquerque Public Schools, used this route to get the Sandia Environmental Education Facility going. This splendid site in the Sandia Mountains is an outstanding example of the community-funded ESA.

Both the National Park Service and the National Education Association have published booklets on the establishment and use of ESA's. The NPS booklet is entitled "National Environmental Study Area--A Guide." You can get a copy by writing to NEED, National Park Service, Washington, D. C. 20240, Attention: Mr. Robert Nunn, who can give

details on other environmental education resources. The NEA booklet, "Man and His Environment, An Introduction to Using Environmental Study Areas," is available from NEA Publications-Sales Section 31, 1201 Sixteenth Street, N. W., Washington, D. C. 20036, at $1.75/copy.

Both booklets are really handy starter resources for the whole field of outdoor environmental education. Most important to you, the ESA concept does not need a particular set-aside geographic area. Any place outdoors--a park, a garbage dump (remember, ESA's are not limited to pristine natural areas; they are used also to show man's impact, good or bad), a ranch, a mine, a reservoir, a dam, an airport--you name it, can be a setting for ESA approaches. And the booklets give you all the clues for getting started.

I've slipped into a mini-listing of resources at this point simply to round out the ESA-NEED discussion. And also, because it is a now thing that is readily available, it deserves emphasis in this context. More outdoor education resources are listed in the next chapter.

At this point, I'm dropping the scenario style in favor of brief "item" descriptions of exemplary environmental education activities:
Item: Middle- or upper-grade students perform environmental survey of their community and arrange with local newspaper, radio, and TV outlets for reportage of their findings, including photographic documentation. (Photography club, art class, debate society, dramatics club--all of these groups should take part.)
Item: Students petition library (museum, college, etc.) to inau-

gurate Environmental Bookshelf, public education programs.

Item: Students isolate socio-economic problem in community and join in political action to rectify it (e.g., poor community services "across the tracks," as they say). Including presentations before city council, planning commission, finance committee, etc.

Item: Same for specific public health problem.

Item: Same for environmental management of community (waste disposal practices, water pollution from industry, construction standards, park needs, etc.). Add the twist of a student-sponsored public forum with government, academic, and conservation-group participation.

Item: Students set up environmental clearinghouse for community where citizens can get information on air and water pollution, trash recycling, environmental poisons (mercury, pesticides, detergents), food adulterants, noise pollution, and so on.

Item: Students man environmental early warning system so that concerned citizens have some place to report nascent problems before they blow up into crises. Students relay information to proper authorities (with "insurance" copy to local conservation organizations).

The potential is endless. The inner-disciplinary mix crosses all lines--nobody is solving anything these days when he says, "It's not in my department." Students get out of the old-fashioned context where education-is-preparation-for-life and jump into a new context where education is life.

Let's face it, every community needs all the help it can get to deal with its environmental problems. Why always pick on the old retired volunteers? Just because kids can't work, in the job-holding sense, doesn't mean that they should be cut out of community life altogether. You'd be frustrated, too, if you were a supernumerary in your society--if you were always in the process of <u>becoming</u>, instead of <u>being</u>, right here and now--if school were a place where you were held in limbo just about long enough to let your ideals and enthusiasms cool and disappear.

Environmental education, properly conceived, puts students into the main stream, where the action is, and all that there.

You can be there, too. So why not try it!

****

CHAPTER III

Readings and Resources

The principle in this chapter is rigorous selection. I want to make you aware of some basic tools which, properly used, will have a multiplier effect, and, are readily available in libraries, for free, or at a reasonable price. I will not deluge you with redundance and bunches of stuff beyond your reach.

One more principle, for you: Perfect your scrounging abilities. Government publications can often be got free if you request them from your Senator, Congressman, or State Legislator. Seek help from your PTA and local conservation groups. Between them, they could most likely fund a basic Environmental Bookshelf and key periodical subscriptions for the school library. Check with parents and organizations as to such publications as Saturday Review (which has excellent supplements monthly on education and environment), Natural History, Audubon Magazine, Sierra Club Bulletin, etc.

Also, many government offices have libraries overflowing with environmental literature, films, and the like, as well as racks of free folders and brochures. Look in your phone book for local, federal and state offices, then check with them about loans.

Basic Readings

These are for your reading pleasure at the philosophical, thought-piece level.

If you want to go deep, to the foundation level of environmental insight, I recommend these two books, which are symposia tapping a broad range of disciplines and many approaches to environmental conservation. Try your library, a nearby college library, or go the library loan route, because these books are expensive.

FUTURE ENVIRONMENTS OF NORTH AMERICA, edited by F. Fraser Darling and John P. Milton, The Natural History Press, Garden City, New York, 1966

THE SUBVERSIVE SCIENCE, ESSAYS TOWARD AN ECOLOGY OF MAN, edited by Paul Shepard and Daniel McKinley, Houghton Mifflin Company, Boston, 1969

Now for a group of paperbacks that should be in any good bookstore near you. These are classics as to the specifics they treat, and some are great literature as well.

SCIENCE AND SURVIVAL, Barry Commoner, Viking Press, New York, 1967. $1.35. (Commoner's principle thesis--don't do it unless you know what is going to happen--is the heart of environmental reform.)

SILENT SPRING, Rachel Carson, Fawcett Publications (Crest Reprint), Greenwich, Conn., 1962. $.75. (Other editions are available; and don't forget Rachel Carson's The Sea Around Us, a beautiful book.)

SO HUMAN AN ANIMAL, Rene Dubos, Charles Scribner's Sons (Lyceum Edition), New York, 1968. $2.45. (Expensive for a paperback, but worth it as a great reading experience.)

THE POPULATION BOMB, Paul R. Erlich, Ballantine Books, New York, 1968. $.95. (Erlich and his wife have just come out with a more comprehensive book, Population Resources and Environment: Issues in Human Ecology--I don't have the full citation.)

A SAND COUNTY ALMANAC, Aldo Leopold, Oxford University Press, New York, reprint 1970. $1.75. (Ruminations and meditations by a great conservationist. Another book along this line is The Outermost House, by Henry Boston, his story of a year alone on the surf-swept tip of Cape Cod.)

THE FRAIL OCEAN, Wesley Marx, Ballantine Books, New York, $.95. (Marx's unravelling of our mischief in the oceans illustrates forcefully the price of ignorance.)

MOMENT IN THE SUN, Robert and Leona Rienow, Ballantine Books, New York, 1967. $.95. (An angry and splendid book by two people who love this country, and hate to see it going down the drain.)

MAN IN THE WEB OF LIFE, John H. Storer, New American Library (Signet Books), New York. $.95. (If you don't have much time and need one book to get your mind oriented to environmental matters, this is a good one.)

I'll stop here, without mentioning many more classics by people like Raymond Dasmann, Marston Bates, Gene Marine, Stewart Udall, et al., but these books will get you started, and their bibliographies will lead you to all the others.

Two more paperbacks I have reserved for special mention because they are action-oriented. With the suggestions and resource listings in these two, you can become an instant eco-activist. Your students, in upper grades, will enjoy them too:

THE ENVIRONMENTAL HANDBOOK, edited by Garrett de Bell, Ballantine Books, New York, 1970. $.95.

ECOTACTICS: THE SIERRA CLUB HANDBOOK FOR ENVIRONMENT ACTIVISTS, edited by Mitchell and Stallings, Pocket Books, New York, 1970. $.95.

Key Periodicals

Earlier, in the discussion about scrounging, I mentioned Natural History, Audubon Magazine, etc. Don't let these nature-oriented titles fool you. Long ago their editors discovered the basic truth that you can't have jots and tittles of healthy environment in a larger context of destruction. So when they talk about

saving a rare species or a particular place, they show how the whole environment must be saved to save any of its parts.

Beyond those periodicals already mentioned, I want to call particular attention to just three. With them, you will have a core periodical shelf.

Environment is the official publication (10 times yearly) of the Scientists' Institute for Public Inforamtion. Don't get scared by the word "scientists" because this is a classic attempt by scientists to translate their arcane knowledge into layman's terms. Their objective is to show the public that environment is too important to be left to specialists. They are giving you the basis for judging science and technology so that you can assert yourself in the body politic. Subscription rate is $8.50/year. Publishers: Committee for Environmental Information, 438 N. Skinker Blvd., St. Louis, Mo. 63130. Because that is a fair amount of coin, maybe you could get a sponsoring organization to subscribe for you. And while you're at it, get the excellent series of nine workbooks so far published by the same Scientists' Institute for Public Information: Air Pollution, Pesticides, Water Pollution, Hunger, Environmental Education, Nuclear Explosives in Peacetime, Environmental Effects of Weapons Technology, Environmental Cost of Electric Power, and Law and the Environment. These workbooks contain narrative discussions of the topic, suggested readings, ideas for public action, etc. They also show how you and your students can utilize the Science Information Committee Chapter or Representative nearest you in

gathering environmental data and devising solutions. Also, through the SIPI you will have access to a Speakers' Bureau for such projects as public forums. You can get the whole packet of workbooks for $6 through Scientists' Institute for Public Information, 30 East 68th Street, New York, N. Y. 10021.

Environmental Education is a professional journal of research and development in environmental communications and education. Some of its articles are a little heavy on theory for my taste. But many others deal with direct school-student participation in the environmental reform movement,including good tips on media use, formats for public presentations, etc. Also, there is good stuff on getting organized for environmental education, written by teachers and administrators who have faced and surmounted your kinds of problems. Subscription rate is $7.50/year. Publishers: Dembar Educational Research Services, Inc., Box 1605, Madison, Wisconsin 53701.

Conservation Foundation Letter is issued monthly by The Conservation Foundation, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036, at $6/year. The usual letter format is concentrated treatment of one very hot and current environmental issue. Lots of good quotes that show countervailing pressures in our society. This is a fine antidote to non-interpreted, superficial reporting of environmental issues. Especially recommended for upper grade classes in current events.

Miscellaneous Publications

The business-industry end of environmental reform is well treated in a special issue of Fortune magazine, February, 1970. This should be in your local library.

Environmental pollution control as the growth industry of the future is explored in the MBA (The Master in Business Administration) for November, 1969. This concept is important, because it allows a new kind of relationship with the business community: When are you going to get on the environmental bandwagon and stop being so negative. This is where the money is! Pollution control is no longer a funny-farm subject in business circles. You can get a copy of this special issue for $1 from MBA Enterprises, 373 Fifth Avenue, New York, N. Y. 10016.

The Department of the Interior has put out a fine series of six conservation yearbooks: Man....An Endangered Species, The Third Wave, The Population Challenge, Quest for Quality, It's Your World, and River of Life. These books have good narratives and splendid graphics which could be clipped or photographed for student projects. The whole series costs $9.75 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. You might be able to get single copies through your Congressman. Also, most local offices of Interior bureaus have copies you might get on loan.

Along this line, the Department of the Interior Library has published an excellent bibliography of Federal government publications,

many of which could be requested through your Congressman. Write to the Department of the Interior Library, Interior Building, Washington, D. C. 20240, for a copy of this bibliography, "Readings for the Eco-Activist."

One more Federal government publication merits special mention, From Sea to Shining Sea, a report on the American Environment by the President's Council on Recreation and Natural Beauty, 1968. $2.50 from the U. S. Government Printing Office. If you had to get just one Federal government publication, this would be it. It's a big 304-page book with good narrative on both the rural and urban environments, plus transportation. The last 100 pages stress modes of action by government, private groups, and education; then it lists books, periodicals, films (for free use), and the local, state, federal, and private agencies and organizations that can help in environmental education.

Public Affairs Pamphlets, 381 Park Avenue, South, New York, N. Y. 10016, produces excellent, but cheap, pamphlets on environmental topics. These could be ordered in bulk, for students. Three items are especially pertinent: "An Environment Fit for People," by Raymond F. Dasmann (Pamphlet No. 421); "Humanizing the City," by Marion O. Robinson (No. 417); and "New Ways to Better Communities," by Elizabeth Ogg (No. 413). These pamphlets are $.25 each, or in orders of 10-99 they are $.20 each. Dasmann's pamphlet is a good 28-page overview of the environment scene. Short but comprehensive in scope, it would be a choice first reading for students 9th grade and up.

Now a few brief citations of other useful publications:

Check the January, 1969, issue of Grade Teacher for a series of articles on "Ecology, Why You Must Teach It." Many good suggestions on experiments, techniques, etc.

"Teaching Conservation through Outdoor Education Areas," U. S. Department of Agriculture, Forest Service, 1968. $.20 from U. S. Government Printing Office.

"Manual of Outdoor Conservation Education," by Joseph J. Shamon, National Audubon Society, 1130 Fifth Avenue, New York, N. Y. 10028, $2.

"Education and Outdoor Recreation," Department of the Interior, Bureau of Outdoor Recreation, 1969. $.75 from U. S. Government Printing Office.

"Guidelines for Citizen Action on Environmental Problems," Environmental Action for Survival, 146F Nat. Res. U of M, Ann Arbor, Michigan 48104. Reasonable requests, free.

"Environmental Health Problems," U. S. Department of Health, Education, and Welfare, Public Health Service, Environmental Health Service, 5600 Fisher's Lane, Rockville, Md. 20852. Reasonable requests, free.

"Community Action for National Beauty," Washington, D. C., 1966. $.40 from U. S. Government Printing Office.

The Science Teacher for September, 1970, contains a special section on Developing an Environmental Ethic, with articles on public health, industrial pollution, architecture, and the status of environmental education in the public schools.

Scientific American for September, 1970, devotes its entire issue to the biosphere, with articles on the basic life-supporting natural cycles, followed by articles on human production processed, and their affects on natural cycles.

Conservation Organizations

First, some of the major national organizations, particularly those

with information services and materials that will aid your teaching, and those that likely have members residing in your community upon whom you could call as resource persons:

Sierra Club, 1050 Mills Tower, San Francisco, California 94104. Rio Grande Chapter active throughout New Mexico. For more information contact Brant Calkin, Central Clearing House, 107 Cienega, Santa Fe, New Mexico 87501.

Wilderness Society, 729 Fifteenth Street, N.W., Washington, D. C. 20005.

National Audubon Society, 1130 Fifth Avenue, New York, N. Y. 10028. For many years active in educational efforts, this society offers publications and films at reasonable prices. Write for their folder, "Publications and Films on Nature Centers and Outdoor Conservation Education"--it's free.

National Association of Soil and Water Conservation Districts, 1025 Vermont Avenue, N. W., Washington, D. C. 20005. Also check with your local district representative.

Conservation Foundation, 1250 Connecticut Avenue, N. W., Washington, D. C. 20036. Check on loan films and publications. Their films are especially good, e.g., "A Matter of Time."

Closer to home, many New Mexico conservation and eco-activist groups are committed to environmental education and can be called upon for help:

New Mexico Conservation Coordinating Council, P. O. Box 142, Albuquerque, New Mexico 87103. Check with this group, which is a coalition of many organizations, for information on conservation organization chapters and members in your community.

New Mexico Citizens for Clean Air and Water, John Bartlit, Acting State Chairman, 113 Monte Rey Drive North, Los Alamos, New Mexico 87544. At the moment, this is the most active, action-oriented state-wide organization. Its role is New Mexico's environmental watch dog. Listed below are local chapters and chairmen:

Albuquerque Chapter
Robert Martin, Chairman
1818 Aliso Drive, N.E.
Albuquerque, New Mexico 87106
Tel. (505) 256-2060

Mrs. James Findley, Secretary
P.O. Box 44
Corrales, New Mexico 87048
Tel. 898-1570

Alamogordo Chapter
Bill Farley, Chairman
1306 Spruce
Alamogordo, New Mexico 88310
Tel. 437-5508

Mrs. Frank Fisk, Secretary
2328 Union Avenue
Alamogordo, New Mexico 88310
Tel. 437-9791

Los Alamos Chapter
Mike Williams, Co-Chairman
3710 Gold Street, Apt. 4
Los Alamos, New Mexico 87544
Tel. 662-3616

John Bartlit, Co-Chairman
(Acting State Chairman)
113 Monte Rey Drive, North
Los Alamos, New Mexico 87544

Espanola Chapter
Randall Speirs, Chairman
Rt. 2, Box 60
Espanola, New Mexico 87532
Tel. 753-2874

Mrs. Jack Aeby
Rt. 1, Box 385A
Espanola, New Mexico 87532
Tel. 753-4239

Santa Fe Chapter
Fermor Church, Chairman
500 Camino Rancheros
Santa Fe, New Mexico 87501

San Juan Citizens for Clean Environment
Dr. James R. Ver Helst, Co-Chairman
4109 Skyline Drive
Farmington, New Mexico 87401
Tel. 325-8275

Anselmo Jaramillo, Co-Chairman
1208 Camino Entrada
Farmington, New Mexico 87401
Tel. 325-3891

Taos Chapter
Harvey Mudd, Chairman
P.O. Box 748
Arroyo Hondo, New Mexico 87513
Tel. 776-2931

The Central Clearing House, 107 Cienega, Santa Fe, New Mexico 87105. A center for environmental information and action. Active in environmental education efforts.

Wildlife and Conservation Association,
P.O. Box 1234, Albuquerque, New Mexico 87103.
Twenty-four chapters in New Mexico. It lists conservation education as one of its principle concerns.

Zero Population Growth, Rt. 3, Box 131, Santa Fe, New Mexico 87501. Is preparing sample environmental education packets for schools.

Also, check your local chapter of the American Association of University Women. The AAUW is in the midst of a 2-year environmental reform project. The stress on education is strong; your local chapter might open many doors to resources and other forms of support.

New Mexico Government Agencies

The State Library has compiled listings of loan publications and films for environmental education. Write to Mrs. Betty Ela, New Mexico State Library, 300 Don Gaspar Avenue, Santa Fe, New Mexico 87501 for more information.

At the New Mexico Department of Game and Fish, Villagra Building, Santa Fe, New Mexico 87501. Norma Ames has compiled a truly excellent environmental education resource guide. It includes bibliographies, curriculum guides, periodicals, pamphlets and books classified by grade level, films, filmstrips, slides, television programs, posters and charts, resource people, field trips,

field guides, and workshops. Write to Norma for a copy of this compilation, Wildlefe Information Notes #3, "Materials Useful in Teaching Wildlife Conservation." And don't worry about that title; she has covered a lot more than wildlife conservation.

The Environmental Services Division of the New Mexico Department of Health and Social Services, P.O. Box 2348, Santa Fe, New Mexico 87501, is active in many fields of public health: air and water pollution, consumer protection, occupational health and safety, sanitation, and environmental management. Write to Director Larry J. Gordon for publications and information as to local aid in environmental education.

Finally, check with the State Planning Office and the Department of Development, 113 Washington Avenue, Santa Fe, New Mexico 87501 for reports and publications on resources and economic development. It is useful, indeed, to see the future through the eyes of these planning groups, which sometimes produce contradictory versions of the future!

That's about all for now. Good luck!

William E. Brown

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